VERIFICATION OF TRANSLATION

I, HOSOKAWA Junko, a citizen of Japan, currently residing at 8-19-427, Shinchujocho, Ibaraki-shi, Osaka, Japan, 567-0872, hereby declare:

That I am fully familiar with the English language and with the Japanese language in which the accompanying Japanese patent application No. 2001-109200 was prepared;

That the annexed English text is believed by me to be a true and accurate translation of the text of Japanese patent application No. 2001-109200; and

That all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed at Osaka, Japan
Date: April 23, 2008

Signature: Hosokawa
HOSOKAWA Junko

[TITLE OF DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] IMAGE PROCESSING APPARATUS

[CLAIMS]

[CLAIM 1]

An image forming apparatus which comprises an independently operable scanner unit equipped with a display section and a display control section, and an independently operable printer unit equipped with a display section and a display control section, in which said scanner unit and said printer unit are provided as separate members, wherein:

the display section of said scanner unit is a large size display unit capable of displaying graphics;

said display control sections of said scanner unit and said printer unit cooperatively control said display sections of said scanner unit and said printer unit such that:

in an independent use of said printer unit, said display section of said printer unit is set to be effective, and

in a combined use of said printer unit and said scanner unit, said display section of said printer unit is set to be effective if a predetermined condition is satisfied,

and if not, only said display section of said scanner unit is set to be effective in displaying information regarding the combined use of said printer unit and said scanner unit.

[CLAIM 2]

The image forming apparatus as set forth in claim 1, comprising:

an input section of the display section of the scanner unit and an input section for the display section of the printer unit,

wherein the display control section of the scanner unit permits an input operation by the input section of the scanner unit when the display section of the scanner unit is effective; and

the display control section of the printer unit permits an input operation by the input section of the printer unit when the display section of the printer unit is effective.

[CLAIM 3]

The image forming apparatus as set forth in claim 1 or 2, wherein:

said printer unit includes a shielding member for shielding said display section to be invisible by a user when said display control section controls said display

section of said printer unit to be ineffective.

[CLAIM 4]

The image forming apparatus as set forth in any one of claims 1 through 3, wherein:

said predetermined condition is that information to be displayed in said printer unit is different from the information regarding the combined use of said printer unit and said scanner unit.

[CLAIM 5]

The image forming apparatus as set forth in any one of claims 1 through 3, wherein:

said predetermined condition is that some failure has occurred in said scanner unit, and said display control section controls said display section of said printer unit to display a state of the failure occurred in said scanner unit.

[CLAIM 6]

The image forming apparatus as set forth in claim 5, wherein:

said display control section of said printer unit controls said display section of said printer unit to display the state of said scanner unit and the state of said printer unit alternately.

[CLAIM 7]

The image forming apparatus as set forth in any one of claims 1 through 3, wherein:

said predetermined condition is that some failure has occurred in said scanner unit or in any other unit to be used in combination with said printer unit, and said display control section controls said display section of said printer unit to display a state of the failure occurred in said scanner unit or in any other unit.

[CLAIM 8]

The image forming apparatus as set forth in claim 2 or 3, wherein:

said predetermined condition is that an input operation is performed by said input section of said printer unit, and said display control section of said printer unit controls said display section of said printer unit to display information regarding said printer unit.

[CLAIM 9]

An image forming apparatus which comprises an independently operable scanner unit equipped with a display section and a display control section and an independently operable printer unit equipped with a display section and a display control section, in which said scanner unit and said printer unit are provided as separate members, wherein:

said display section of said scanner unit is a large size display unit capable of displaying graphics, said display section being provided on a front surface side of said scanner unit;

said display section of said printer unit is provided on an upper surface on a back surface side of said printer unit; and

in a combined use of said printer unit and said scanner unit, said scanner unit is provided above said printer unit, and said display section of said printer unit is invisible by a user.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[INDUSTRIAL FIELD OF THE INVENTION] The present invention relates to an image forming apparatus such as a copying machine, etc., provided with at least independently operable scanner unit and an independently operable printer unit respectively provided with display sections.

[0002]

[PRIOR ART] In recent years, an image forming apparatus which can be functioned as a copying machine, a facsimile machine, etc., as explained in the above by

combining an independently operable scanner unit for optically reading a document image and an independently operable printer unit for forming an image onto a sheet has an increasing demand.

[0003] In such image forming apparatus, information required for various setting on a printer unit such as a number of prints, etc., is displayed on the print data output side such as a personal computer, etc., and in the printer unit, provided is a small-size display section capable of displaying a message in "Alphabetic Numeric and Kana", in length of two lines or so. On the other hand, the scanner unit is provided with a large size display section capable of displaying graphics, for i) setting reading condition, a receiving end of data as read, ii) displaying information required for inputting a mail address in transmitting the data an electronic mail, or iii) selecting a paper size or setting a number of copies when the scanner unit is combined with the printer unit to be functioned as a copying machine, etc.

[0004] Then, in the combined use of the scanner unit and the printer unit as the copying machine, etc., conventionally, the respective states of the scanner unit and the printer unit are displayed in respective display sections. Therefore, only a short message can be displayed

in the printer-side display section, and for the message in two or more lines, it is required to scroll the display by operating the UP key or the DOWN key, thereby presenting the problem of vexatious complication in displaying complicated processes to be recovered from a paper jam, or other trouble, etc.

[0005] In response, as a typical conventional structure in consideration of the foregoing problem, Japanese Unexamined Patent No. 8-297388/1996 (Tokukaihei 8-297388) discloses a display structure in the combined use of a scanner unit and a printer unit, wherein an error or a status on the side of the printer unit is displayed using a scanner-side display input unit (operation panel).

[0006] Japanese Unexamined Patent Publication No. 6-253084/1994 (Tokukaihei 6-253084) discloses a composite machine terminal equipment provided with a variety of functions such as a print function, a copy function, a facsimile function, etc., wherein when its functions are to be expanded, an operation panel provided as a standard equipment and a detachably provided operation panel as expansion display means are controlled so that both panels can cooperatively operate, to attain an improvement in economical aspect.

[0007]

[PROBLEMS TO BE SOLVED BY THE INVENTION] In the foregoing conventional examples, complicated information on the printer unit is displayed using the large size display section of the scanner unit or other detachably attached unit. However, the above conventional display structures have such problem that the user gets confused as it is unclear which of the plurality of display sections is to be seen. For example, in a combined use of the scanner unit and the printer unit, generally, the user sees both of the display sections of these units which are provided one above the other, and performs a necessary processing based on the information displayed in either one of the display sections, which the user finds more useful.

[0008] An object of the present invention is to provide an image forming apparatus which offers an effective use of a large size display section of a scanner unit and which eliminates the problem of vexatious complication in referring to display sections.

[0009]

[MEANS TO SOLVE THE PROBLEMS] The image forming apparatus of the present invention is an image forming apparatus which includes an independently

operable scanner unit equipped with a display section and a display control section and an independently operable printer unit equipped with a display section and a display control section, in which said scanner unit and said printer unit are provided as separate members, wherein: the display section of said scanner unit is a large size display unit capable of displaying graphics; said display control sections of said scanner unit and said printer unit cooperatively control said display sections of said scanner unit and said printer unit such that: in an independent use of said printer unit, said display section of said printer unit is set to be effective, and in a combined use of said printer unit and said scanner unit, said display section of said printer unit is set to be effective if a predetermined condition is satisfied, and if not, only said display section of said scanner unit is set to be effective in displaying information regarding the combined use of said printer unit and said scanner unit.

[0010] According to the foregoing structure of the image forming apparatus wherein at least the independently operable printer unit are combined, which can be functioned, for example, as a copying machine, information required for the setting of the processing by

the printer unit such as a number of copies, etc., is displayed on the print data output side, such as a personal computer, etc. On the other hand, the scanner unit is provided with a large size display section capable of displaying graphics, etc., for displaying information required for the setting on reading conditions, or setting receiving end of read data.

[0011] Here, in the combined use of the printer unit and the scanner unit as the copying machine, it may be arranged so as to display information regarding the printer unit is also displayed in the display section of the scanner unit. However, when adopting such arrangement without any restricted condition, the following problem may typically occur. That is, the user gets confused in recognizing which of the information displayed in the display section of the scanner unit provided above the printer unit, or the information displayed in the section of the printer unit provided under the scanner unit is to be referred to.

[0012] In response, the present invention sets a predetermine condition, such as an occurrence of failure, etc., in the combined use of the printer unit and the scanner unit, as a copying machine, etc., and only the display section of the scanner unit is usually set effective,

and the display section of the printer unit is set effective only under the predetermined condition. In this way, the user needs to see only one of the display sections, which is set effective, and the problem of vexatious complication in checking both of the display sections can be eliminated. As a result, improved operability and convenience can be achieved, and in the meantime, the effect of reducing power comsumption can be expected.

[0013] The image forming apparatus of the present invention is arranged so as to include: an input section for the display section of the scanner unit and an input section for the display section of the printer unit, wherein the display control section of the scanner unit permits an input operation by the input section of the scanner unit when the display section of the scanner unit is effective; and the display control section of the printer unit permits an input operation by the input section of the printer unit when the display section of the printer unit is effective.

[0014] According to the foregoing structure, the display control sections also controls if input operations by the input section are to be permitted, which are typically provided adjacent to the respective input sections or integrally provided with the display sections as touch panels, etc., according to if the corresponding

display sections are effective or not.

[0015] According to the foregoing structure, the user only needs to perform input operations by using respective input section provided adjacent to or integrally with the display sections, thereby simplifying the input operation by the user.

[0016] The image forming apparatus of the present invention is arranged such that the printer unit includes a shielding member for shielding the display section to be invisible by a user when the display control section controls the display section of the printer unit to be ineffective.

[0017] According to the foregoing structure, in the case where no information is displayed, the display section itself is shielded by the shielding member such as a slide shutter, etc., so that the display section is not visible by the user. In this way, the user needs not check the contents of the information displayed in the display section but only needs to see the display section itself of the scanner unit, and it is therefore possible offer a better solution to the problem of vexatious complication.

[0018] The image forming apparatus of the present invention is arranged such that the predetermined condition is that information to be displayed in the printer

unit is different from the information regarding the combined use of the printer unit and the scanner unit.

[0019] According to the foregoing arrangement, in the combined use of the printer unit and the scanner unit, information other than the information regarding the combined use of the printer unit and the scanner unit are displayed in the display section of the printer unit, such as date/time, characters in amusement use, etc. It is therefore possible to provide other information to the user while eliminating the complicated process of confirming the display, etc.

[0020] The image forming apparatus of the present invention is arranged such that: the predetermined condition is that a failure has occurred in the scanner unit, and the display control section of the printer unit controls the display section of the printer unit to display a state of the scanner unit.

[0021] According to the foregoing structure, in consideration of such possibility that the large-size display section may not be functioned properly, the display section of the printer unit is used to display the state of the scanner unit. It is therefore possible to promptly inform the user of the occurrence of the failure and to reduce the downtime of the apparatus due to the

failure.

[0022] The image forming apparatus of the present invention is arranged such that: the display control section of the printer unit controls the display section of the printer unit to display the state of the scanner unit and the state of the printer unit alternately.

[0023] According to the foregoing structure, in response to the failure occurred in the scanner section, the state of the failure is displayed in the display section of the printer unit in such a manner that a display indicative of the state of the scanner unit and a display indicative of the state of the printer unit appear alternately. In this way, the user can be indicated not only the state of the failure in the scanner unit but also the state of the print processing of the printer unit.

[0024] The image forming apparatus of the present invention is arranged such that: the predetermined condition is that some failure has occurred in the scanner unit or in any other unit to be used in combination with the printer unit, and the display control section controls the display section of the printer unit to display a state of the failure occurred in the scanner unit or in any other unit.

[0025] According to the foregoing structure, the state

of failure not only in the scanner unit but also in the feed unit and discharge unit or other optional unit is displayed if occurred. When adopting such display structure wherein a failure indicative display appears only when the corresponding function is selected, and such display does not appear in the normal state, due to a possible delay in forming the user of the occurrence of failure, it takes time to be recovered from the failure. However, according to the foregoing structure of the present invention, as other display section than the large size display section which is used under normal condition, the message indicative of the occurrence of failure is displayed in the display section of the printer unit to call for the user's attention. In this way, it is possible to promptly inform the user of an occurrence of the failure and reduce the downtime caused by the failure.

[0026] The image forming apparatus of the present invention is arranged such that: the predetermined condition is that an input operation is performed by the input section of the printer unit, and the display control section of the printer unit controls the display section of the printer unit to display information regarding the printer unit.

[0027] According to the foregoing structure, upon

operating the printer unit, the user tries to obtain the information regarding the printer unit, and thus by displaying the state of the printer unit, an interface which is easy to recognize can be realized.

[0028] The image forming apparatus of the present invention is an image forming apparatus which includes an independently operable scanner unit equipped with a display section and a display control section and an independently operable printer unit equipped with a display section and a display control section, in which said scanner unit and said printer unit are provided as separate members, wherein: the display section of the scanner unit is a large size display unit capable of displaying graphics, the display section being provided on a front surface side of the scanner unit; the display section of the printer unit is provided on an upper surface on a back surface side of the printer unit; and in a combined use of the printer unit and the scanner unit, the scanner unit is provided above the printer unit, and the display section of the printer unit is invisible by a user.

[0029] According to the foregoing structure, in an independent use of the printer unit, there is no object above the display section of the printer unit, and the display section of the printer unit is therefore within a

visible range of the user. On the other hand, in a combined use of the printer unit and the scanner unit, the scanner unit is provided above the printer unit, and the display section of the user therefore becomes invisible by the user.

[0030] According to the foregoing structure, the state of the display section of the printer unit can be structurally switched between the visible state in which the display section is visible by the user and the state in which the display section is invisible by the user. As a result, the problem of vexatious complication can be eliminated, and an improved operability and convenience can be achieved.

[0031]

[EMBODIMENTS] One embodiment of the present invention will be explained in reference to Figure 1 to Figure 13.

[0032] Fig. 1 is a longitudinal cross-sectional view of an image forming apparatus 1 in accordance with the present embodiment of the present invention. The image forming apparatus 1 includes a printer unit 2 as a main unit, and also includes a scanner unit 3, an automatic document feeder 4, a sheet post-processing unit 5, a multi-stage feed unit 6, a relay transport unit 8, and a

both-sided transport unit 10, so as to expand the functions thereof. The scanner unit 3 and the automatic document feeder 4 mounted thereon are supported on a system rack 7, to be placed above the printer unit 2 and the sheet post-processing unit 5.

[0033] The printer unit 2 is provided not only for printing recorded image as read by the scanner unit 3 but also outputting recorded image data as received from an external connection equipment in the connected state with an external equipment such as a personal computer, etc. The scanner unit 3 is provided with an automatic scanning mode, and a manual scanning mode. In the automatic scanning mode, an image on an original document sheet is read out by automatically supplying original document sheets by the automatic document feeder 4 one by one to be subjected to exposure scanning. In the manual scanning mode, an image on an original document sheet which cannot be fed automatically by the automatic document feeder 4 is read by manually setting the original document sheet. In the present invention, the independently operable printer unit 2 and the independently operable scanner unit 3 are combined into a system to be cooperable, to realize the functions as a copying machine or a facsimile machine, etc.

[0034] In the printer unit 2, to the left from around the center of the main body apparatus, provided is an electrophotographic processing section 20 which has a drum-shaped photoreceptor 20a at its center. Along the circumference of the photoreceptor 20a, provided are a charge roller 20b for uniformly charging the surface of the photoreceptor 20a, an optical scanning unit 22 for writing an electrostatic latent image by scanning an optical image on the uniformly charged photoreceptor 20a, a developer unit 20c for visualizing an electrostatic latent image written by the optical scanning unit 22, a transfer unit 20d for transferring the image recorded and reproduced on the photoreceptor 20a onto a sheet, a cleaning unit 20e which enables a new image to be recorded on the photoreceptor 20a by removing the developer remaining on the photoreceptor 20a, an eraser lamp unit (not shown) for removing the charge from the surface of the photoreceptor 20a, etc.

[0035] Below the main body of the printer unit 2, provided is a paper feed section 21 installed in the main body. The paper feed section 21 includes a paper storage tray 21a for storing sheets of paper, and a separate feed section 21b for separating sheets as fed from the paper feed section 21 one by one to be fed in order in between

the photoreceptor 20a and the transfer unit 20d of the electrophotographic process section 20, thereby transferring recorded/reproduced image onto the photoreceptor 20a. In this structure, sheets of paper are supplied to the paper feed section 21 by pulling the paper storage tray 21a to the front side of the main body of the printer unit 2.

[0036] On the bottom surface of the main body of the printer unit 2, formed is a sheet receiving entrance 27 for sequentially feeding sheets as fed from the multi-stage feed unit 6, etc., as the peripheral equipment, etc., to a spacing between the photoreceptor 20a and the transfer unit 20d of the electrophotographic processing section 20.

[0037] Above the electrophotographic process section 20, provided is a fuser 23 which receives sheets having images transferred thereto one by one, and makes the developing agent transferred onto the sheet to be affixed thereto with an application of heat, and then discharges the resulting sheets having images permanently affixed thereto to the outside of the fixing unit 23. The sheet having an image recorded thereon is passed to the relay transport unit 8 on the upper surface of the main body of the printer unit 2 from the discharge roller 28 of the printer unit 2.

[0038] In the spacing above and below the optical scanning unit 22, provided are a printer unit control section 24, an image control section 25 and a power source unit 26. The printer unit control 24 stores therein a process control unit (PCU) substrate for controlling an electrophotogaphic process and an interface substrate for receiving image data from an external equipment. The image control section 25 includes an image control unit (ICU) substrate for carrying out a predetermined processing of image data as received from the interface substrate and scanning/recording the resulting image data as an image by the optical scanning unit 22. The power source unit 26 is provided for supplying power with respect to substrates and units of various types.

[0039] The multi-stage feed unit 6 includes three paper feed sections 61, 62 and 63 which are detachably attached to the main body, and sheets of paper stored in the paper storage trays 61a, 62a and 63a of the sheet feeder sections 61, 62 and 63 are separated by the separation feeder means 61b, 62b and 63b one by one to be placed on the upper surface of the unit 6, and is supplied to the paper discharge opening 65 connected to the paper receiving opening 27 of the printer unit 2. In the present invention, while the processing is being

carried out, the paper feed section 21, 61, 62 or 63 which stores paper of size as desired is selectively operated. To the sheet feeder section 61, 62 or 63 paper can be supplied by pulling in the respective paper storage trays 61a, 62a or 63a to the front side of the unit main body, and the paper feed section 62 and the paper feed section 63 store paper in the same size.

[0040] The present embodiment is assembled such that the printer unit 2 and the post processing unit 5 are provided above the multi-stage feed unit 6, and to enable this assembly as it is to be moved to and to be fixed in the system rack 7, moving rollers 67 and fixing sections 66 are formed on the bottom surface of the multi-stage feed unit 6. Specifically, the assembly is moved by lifting it up from the floor by rotating the fixing sections 66. On the other hand, the assembly is fixed by placing it down until the fixing sections 66 reach the floor, thereby fixing the multi-stage feed unit 6. In the above, explanations have been given through the case of adopting three paper feed sections 61, 62 and 63; however, the present invention is not intended to limit the number of the paper feed sections, and one or two, or four or more paper feed sections may be adopted. As to these paper feed sections, the structure wherein all the plurality of sheet feed

sections are laminated may be adopted.

[0041] The sheet post processing unit 5 is arranged so as to receive sheets of paper having formed thereon images from a receiving roller 50 as discharged from the relay transport unit 8 and the printer unit 2 in the upper part of the unit 5, and carries our the post-processing for the sheets of papers. Here, non-limited examples of the post-processing include stapling, sorting, etc. The sheet post processing unit 5 of the present embodiment is arranged so as to include three discharge trays 51a, 51b and 51c, and when discharging sheets of paper, if necessary, the discharge tray 51 for discharging sheets of paper is switched by gates 52 and 53. The multi-stage feed unit 6 can be selectively used, for example, such that the upper discharge tray 51a is used for discharging sheets of paper in the copy mode, the intermediate discharge tray 51b for discharging sheets of paper in the print mode, and the lower discharge tray 51c for discharging sheets of paper in the facsimile print mode.

[0042] The scanner unit 3 performs an exposure scanning with respect to an image of an original document set on a transparent document placement plate 30 by a first scanning unit 31 and a second scanning unit 32 which move along the document placement plate 30 at a

predetermined relative speed, and forming an image on a photoelectronic transfer unit 34 using optical components such as a mirror, an image forming lens 33, etc., thereby outputting the image on the original document after being converted into an electronic signal.

[0043] The automatic document feeder 4 includes a document transport section 41 for transporting an original document placed on a document set tray 40 onto the document placement plate 30 and discharging the document after the scanning onto a document discharge tray 42. The automatic document feeder 4 is arranged such that the front side thereof can be opened and closed by rotating it upwards about the back side of the automatic document feeder 4 or downwards to the original closed position so that an original document sheet, which cannot be fed by the automatic document feeder 4, can be placed on the document placement plate 30 for the scanning.

[0044] The intermediate transport unit 8 is provided above a discharge tray 29 mounted on top of the main body of the printer unit 2. This intermediate transport unit 8 is provided for feeding sheets having images recorded thereon as discharged from the printer unit 2 towards the sheet post-processing unit 5 provided on the

downstream side of the printer unit 2. From the midway of a sheet transport path 84 of the relay transport unit 8, another sheet transport path 83 is branched for guiding sheets of paper onto the discharge tray 9 composed of the upper surface 82 of the relay transport unit 8 and the upper surface 54 of the sheet post processing unit 5. Either one of these discharge ends can be selected by switching a gate 81 provided at the branch section of the transport path.

[0045] The described discharge tray 9 is also functioned as an inverse transport path for the sheets of paper, and together with the detachably mounted both-sided transport unit 10, this discharge tray 9 enables images to be formed on both sides of the sheet of paper. Therefore, the discharge roller 28 is rotatable in both forward and backward direction. When the gate 81 is switched to the solid line side of Fig. 1, the sheet of which the fixing is completed is discharged to the receiving roller 50 when the sheet post-processing unit 5 is mounted, and is discharged to the discharge tray 9 when the sheet post -processing unit 5 is not mounted. When the discharge tray 9 is used as the inverse transport path as the aforementioned, the sheet is pulled back and is inversely transported to a both-sided transport path 11. As such,

the image formation on both sides of the sheet is possible.

[0046] Figure 2 is a block diagram schematically illustrating display control structures of the printer unit 2 and the scanner unit 3 respectively provided with a display section 201 and a display section 301. The display section 201 of the printer unit 2 is constituted by a small size LCD (Liquid Crystal Display Device), while the display section 301 of the scanner unit 3 is constituted by a large size LCD. The essential feature of the present invention with regard to the display control structures lies in that in the independent use of the printer unit 2, various information such as a message indicative of paper jam, etc., is displayed on the small size display section 201 of the printer unit 2, while in the combined use of the printer unit 102 with the scanner unit 3, not only the information on the scanner unit 3 but also the information on the printer unit 2 are displayed on the large size display section 301 of the scanner unit 3. In normal state, no information is displayed in the display section 201 of the printer unit 2 (blank display).

[0047] More specifically, the display section 301 of the scanner unit 3 is connected to a scanner controller 302 serving as a display control section of the display

section 301 of the scanner unit 3, and the scanner control section 302 is connected to a printer controller 202 serving as a display control section of the display section 201 of the printer unit 2 via bus line, etc. Namely, in the image forming apparatus 1 of the present embodiment, detailed information regarding the scanner unit 3, the printer unit 2 and an entire system, which are to be displayed in the display section 301 of the scanner unit 3 are all controlled by the printer controller 202. Therefore, in the image forming apparatus 1, both the display contents of the printer unit 2 and the display contents of the scanner unit 3 are stored beforehand in a VRAM (Video Random Access Memory) 203 of the printer controller 202.

[0048] As described, respective information on the display of the printer unit 2 and the display of the scanner unit 3 are unitary managed by the printer controller 202 provided in the printer unit 2, and it is possible to save the memory. However, in consideration of the case where the VRAM 203 in the printer unit 2 is used in combination with the scanner unit 3 (as a system), the VRAM 203 also stores information on the contents to be displayed on the large size display section 301 of the scanner unit 3. Namely, in the state where the scanner

unit 3 is not attached, the information of the system, including messages in "Alphabetic Numeric and Kana", etc., to be displayed in the small size display section 201 and the drawing data and character data to be displayed in the large size display section 301 are stored into the VRAM 203 for each display information. On the other hand, in the state where the scanner unit 3 is attached, the display information of the system including only the drawing data and character data to be displayed in the large size display section 301 are stored in the VRAM 203 for each piece of display information.

[0049] Further, a driver for the display section 201 of the printer unit 2 is possessed by an engine controller 204. Namely, a display in the display section 201 of the printer unit 2 is performed by the engine controller 204 based on a character string command sent from the printer controller 202. Further, in response to an input operation by the operation section 201 composed of keys of various kinds to be described later, the engine controller 204 sends a command to the printer controller 202. Namely, the engine controller 204 recognizes which key is operated, and informs the contents as recognized to the printer controller 202.

[0050] In response to an input operation performed

with respect to the operation section 310 composed of keys of various kinds of the scanner unit 3, the scanner controller 302 sends a command to the printer controller 202. Namely, the scanner controller 302 recognizes which key is operated, and informs the contents as recognized to the printer controller 202.

[0051] Figure 3 is a front view of an operation panel 300 of the scanner unit 3. This operation panel 300 is mounted on the upper surface of the scanner unit 3, and includes the large-size display section 301, and an operation section 310. In the present invention, an overall system can be controlled by using the operation panel 300. The keys of various kinds formed on the operation section 310 include a start key 311, an all clear key 312, a clear key 313, a ten key 314, and a set of mode switch keys 315, which includes a print mode key 315a, an image send key (scan mode key) 315b, a copy mode key 315c, and a job status key 315d.

[0052] The start key 311 is a key for entering a command to start the corresponding processing in a mode set by each of the keys of various kinds. The all clear key 312 is provided for resetting the image forming apparatus 1 to the standard mode by clearing all the currently selected setting. The clear key 313 is provided for clearing

a currently selected setting, for example, as input using a ten key 314, etc. The ten key 314 is provided for inputting numeric data such as a number of copies, etc. The mode switch keys 315a, 315b and 315c are provided for switching the processing mode. The job status key 315d is provided for displaying a progress report of the job (key for displaying the job(s) on standby).

[0053] A default screen (standby screen) on the display section 301 of the operation panel 300 having the foregoing structure is a copy mode screen as illustrated in Figure 4. Here, for example, upon operating the image send key 315b, for switching the processing mode, it is switched from the copy mode to the image send mode, and the screen displayed in the display section 301 is as shown in Figure 5. Here, the scan mode indicates a processing mode in which image data of an original document as read by the scanner unit 3 is transmitted to the receiving end, such as a facsimile transmission mode, SCAN TO E-mail mode, SCAN TO FTP (FTP: File Transfer Protocol) mode, etc.

[0054] When the user depresses the job status key 315d for displaying the screen for the progress report of the job, for example, a screen as illustrated in Figure 6 is displayed which allows the user to check the status of the

job on standby.

[0055] As described, the printer unit 2 is independently operable, and therefore the printer unit 2 is also provided with an operation panel 200, for example, as illustrated in Figure 7. The operation panel 200 includes the described small size display section 201, the display section 205 composed of the LED (Light Emitting Diode), and an operation section 210. The display section 205 is switched ON/OFF according to the display state of the printer unit 2.

[0056] The operation section 210 includes a menu key 211, an up key 212, a down key 213, a back/end key 214, a confirm key 215 and an information key 216.

[0057] In the following, the display structure of the image forming apparatus 1 of the foregoing structure will be explained in details while comparing a display example for the display section 301 of the scanner unit 3 with a display example for the display screen 201 of the printer unit 2. The display example illustrated in Figure 8 of the display section 301 is a default screen (standby screen). In the wait state, the image forming apparatus 1 is set in the copy mode. Therefore, a screen for the copy mode is displayed in the display section 301.

[0058] On the other hand, no information is

displayed in the display section 201 of the printer unit 2 (blank display). In the independent use of the printer unit 2, only a printing operation is permitted, and the standby screen as illustrated in Figure 9 is displayed.

[0059] Figure 10 illustrates a display example of the display section 301 when a paper jam occurs in a longitudinal transport path 11 of the printer unit 2. As illustrated, in the display section 301, the steps for recovering from the paper jam are guided with drawings in the display section 301. Here, the portion corresponding to the both-sided transport unit 10 of the image forming apparatus 1 is displayed in different manner from other parts so as to receive the user's attention to that part. Further, the steps of opening the both-sided transport unit 10 are also displayed in an enlarged scale. With this display of the display section 301, the user can recognize at a glance the complicated steps of recovering from the paper jam by indicating the user, for example, the part of the apparatus to be released to remove the jammed paper, etc.

[0060] In contrast, no information is displayed (blank display) in the display section 201 of the printer unit 2. In the independent use of the printer unit 2, as illustrated in Figure 11, a short message in "Alphabetic Numeric and

Kana" in length of at most two lines is displayed in the display section 201. Therefore, it is difficult for the user to recognize the steps for recovering from the paper jam.

[0061] Figure 12 illustrates a display example of the display section 301 of the scanner unit 3 in the case where the high capacity paper storage trays 62a and 63a are out paper, and sheets of paper are to be supplied thereto. In this case also, the steps for supplying paper are guided with drawings. Specifically, the portion corresponding to the paper storage trays 62a and 63a of the image forming apparatus 1 is displayed in different manner from other parts, by flashing, etc., so as to receive the user's attention to that portion, and further, the steps of pulling in the paper storage trays 62a and 63a are also displayed in an enlarged scale, whereby the user can recognize the steps of supplying paper with ease, and an improved operability can therefore be achieved.

[0062] In contrast, no information is displayed (blank display) in the display section 201 of the printer unit 2. In the independent use of the printer unit 2, as illustrated in Figure 13, a short message indicative of the same contents is displayed in the display section 201 of the printer unit 2 in "Alphabetic Numeric and Kana" in at most two lines, which is difficult for the user to recognize the steps of

supplying paper.

[0063] As described, the image forming apparatus 1 of the present invention constitutes a system in combination of the independently operable printer unit 2 equipped with the display section 201, and the independently operable scanner unit 3 equipped with the large-size display section 301, wherein in the normal state, detailed data on the entire system including the printer unit 2 is displayed only in the large-size display section 301 of the scanner unit 3, and no information is displayed in the display section 201 of the printer unit 2. With this display structure, the user needs to refer to only the information displayed in the display section 301 of the scanner unit 3, and therefore an improved display service for the user can be realized in terms of simplicity, operability, convenience, and also the effect of reducing power consumption can be expected.

[0064] The image forming apparatus 1 of the present embodiment may be arranged such that an input operation of the operation section 210 or 310 is permitted in the state where information are displayed in the corresponding display section 201 or 301. With this arrangement, the user can perform an input operation only by using the operation section related to the display

section being used, and the simplified input operation can therefore be realized.

[0065] The following will explain another embodiment of the present invention with reference to Figures 14 to 18.

[0066] An image forming apparatus of the present embodiment has the same basic structure as the image forming apparatus 1 of the previous embodiment as explained in reference to Figures 1 to 3 and 7, and the explanations thereof shall be omitted here. The present embodiment is characterized in that a display section 201 of the printer unit 2 which displays different information from the information displayed in the display section 301 of the scanner unit 3 in the combined use of the printer unit 2 and the scanner unit 3 is adopted in replace of the display section 201 which does not show any information (blank display) in such combined use adopted in the previous example.

[0067] For example, in a display example of Figure 14, the display section 201 of the printer unit 2 displays current time as different information from the information displayed in the display section 301 of the scanner unit 3. The display section 301 may be arranged so as to display amusement use display such as character scrolling or

animation screen, etc. According to the display structure of this example, it is possible to provide other information to the user without the problem of vexatious complication in checking the displayed contents.

[0068] In another example shown in Figure 15, current time is displayed in the screen shown in Figure 15(a) as different information from the information displayed in the display section 301 as in the case of Figure 14. In this example, upon operating the operation section 210 provided next to the display section 201, the display screen is switched to a display of Figure 15(b) which displays the contents of the job being performed by the printer unit 2. When operating the printer unit 2, the user desires for the information regarding the printer unit 2 being used. Therefore, by displaying the state of the printer unit 2 as shown in Figure 15(b), interfaces which are easy to recognize can be realized.

[0069] Here, it may be arranged so as to reset the display of the printer unit 2 to the original display using a timer, or to display only when a corresponding key of the operation section 210 is operated.

[0070] A still another display example is shown in Figure 16. In this display example, the display section 201 displays as different information from the information

displayed in the display section 301, a failure in the scanner unit 3 if the printer controller 202 determines that some failure has occurred in the scanner unit 3. In the event that a failure has occurred in the scanner unit 3, the display system of the display section 301 may not be functioned properly. In response, this example of the present embodiment is arranged so as to immediately inform the user of an occurrence of failure in the scanner unit 3 by displaying a message indicative of an occurrence of the failure using the display section 201 of the printer unit 2 to call for the user's attention, which is the blank display in the normal state. As a result, a downtime of the apparatus due to the failure of the scanner unit 3 can be reduced.

[0071] A yet still another display example of the display section 201 is shown in Figure 17. In this display example, as shown in Figure 17(a), as different information from the information displayed in the display section 301, the display section 201 displays a message indicative of an occurrence of a failure in the scanner unit 3 as in the case of Figure 16. Further, display section 201 also displays as shown in Figure 17(b) a message indicative of the contents of the job being performed by the printer unit 2 as in the case of Figure 15(b). The

display section 201 of in this example is arranged such that the display of Figure 17(a) and the display of Figure 17(b) appear alternately. Even when some failure occurs in the function of the scanner unit 3, the printer unit 2 can be expected to be functioned properly. Therefore, by alternately displaying the message indicative of the contents of the job being performed by the printer unit 2 and the message indicative of the occurrence of the failure in the scanner unit 3, it is possible to inform the user the user of both an occurrence of failure and the printing state.

[0072] A yet still another display example of the display section 201 is shown in Figure 18. In this display example, as different information from the information displayed in the display section 301, the display section 201 displays a message indicative of an occurrence of some failure in an optional unit to be used in combination with the printer unit 2. Specifically, in this display example, Figure 18(a) displays a message indicative of an occurrence of a failure in the both-sided function caused by some mechanical trouble in the both-sided transport unit 10. Figure 18(b) displays a message indicative of an occurrence of a failure in the post-processing function caused by some mechanical trouble occurred in the sheet

post-processing unit 5. Figure 18(c) displays a message indicative of that the post-processing function is disabled by other reason than the mechanical trouble in the sheet post-processing unit 105, such as running out of needles for stapler, etc. Figure 18(d) displays a message indicative of, for example, a failure in the feed unit 61.

[0073] Conventionally, the user is informed of a failure in the optional unit from a displayed message indicative of that the optional unit is disabled by a failure occurred in the optional unit upon selecting a mode using that optional unit. For example, in the case of the failure occurred in the sheet post-processing unit 5, upon selecting a 1 → 2 (both-sided copying from the single-sided document) mode or a 2 → 2 (both-sided copying from the both-sided document) mode in the operation section 310 of the scanner unit 3, a message indicative of that "the both-sided function is in failure" is displayed. With this conventional structure, however, the informing of a message indicative of an occurrence of a failure may be delayed, and thus an appropriate action for the failure may not be timely taken. In response, according to this example of the present invention, upon confirming an occurrence of a failure in any of the optional units, a message indicative of an occurrence of

failure is displayed in the display section 201 of the printer unit 2. As a result, as in the case of an occurrence of a failure in the scanner unit 3, it is possible to promptly inform the user of an occurrence of the failure in the optional unit, and the downtime due to a failure of the optional unit can therefore be reduced.

[0074] The following will explain still another embodiment of the present invention with reference to Figure 19 and Figure 20.

[0075] Figure 19 is a perspective view of an image forming apparatus 1a in accordance with still another example of the present embodiment. For ease of explanation, members having the same functions as those shown in the drawings pertaining to the above-discussed image forming apparatus 1 will be given the same reference symbols, and explanation thereof will be omitted here. The image forming apparatus 1a is characterized by being provided with a slide shutter 250 which can cover an operation panel 200a of a printer unit 2a. This slide shutter 250 can be opened and closed under the control of the printer controller 202 explained earlier. In the image forming apparatus 1 of the previous embodiment, in the combined use of the printer unit 2 with the scanner unit 3,

the display section 201 of the printer unit 2 shows a blank display. In contrast, the image forming apparatus 1a of this embodiment is arranged such that in the combined use of the printer unit 2 with the scanner unit 3, the slide shutter 250 is closed so that the display section 201 itself becomes invisible by the user.

[0076] Specifically, in the independent use of the printer unit 2a, as illustrated in Figure 20(a), the slide shutter 250 is opened so that the display section 201 is visible by the user. On the other hand, in the combined use of the printer unit 2a with the scanner unit 3, the slide shutter 250 is closed as illustrated in Figure 20(b).

[0077] In the foregoing display structure, in the closed state of the slide shutter 250, the display section 201 is not necessarily be a blank display, and the display section 201 may be arranged shows a display similar to those of the conventional display structure. In this way, although the effect of reducing power consumption cannot be expected, it is possible to suppress a modification in system to the minimum. Further, between the opened state and the closed state of the slide shutter 250, it is not necessarily switch the operation section 210 between an input operation permitted state and an input operation

prohibited state.

[0078] According to the foregoing structure, the user does not need to confirm the contents displayed in the display section 301 but only needs to see the display section 301 itself, whereby a still improved solution to the problem of vexatious complication can be achieved.

[0079] The following will explain still another embodiment of the present invention with reference to Figure 21 and Figure 22.

[0080] Figure 21 is a perspective view of an image forming a printer unit 2b which constitutes an image forming apparatus of the present embodiment. Figure 22 is a side view of the image forming apparatus 1b adopting the printer unit 2b. For ease of explanation, members having the same functions as those shown in the drawings pertaining to the above-discussed image forming apparatus 1 or 1a will be given the same reference symbols, and explanation thereof will be omitted here. The image forming apparatus 1b of the present embodiment is characterized in that an operation panel 200b (Figures 21 and 22) of the printer unit 2b is provided on the upper surface on the back surface side of the printer unit 2b, while an operation panel 300 (Figure 22) of the scanner

unit 3 is provided on the front surface side of the scanner unit 3.

[0081] According to the foregoing structure, as illustrated in Figure 21, in the independent use of the printer device 2b, there is no object above the operation panel 200b of the printer unit 2b, and the operation panel 200b is therefore situated within visible regions W11 and W12 of users P1 and P2 as illustrated in Figure 22, and is also situated in operable regions W21 and W22. Therefore, the users P1 and P2 can see the display section 201 of the printer unit 2b, and an input operation is therefore permitted.

[0082] In contrast, in the combined use of the printer unit 2b and the scanner unit 3, as illustrated in Figure 22, the scanner unit 3 is positioned above the printer unit 2b, and the users P1 and P2 therefore cannot see the display section 201 of the printer unit 2b, and the input operation is therefore not permitted. As described, according to the foregoing structure of the present embodiment, it is possible to structurally switch the state of the display section 201 between the visible state and the invisible state.

[0083] In the foregoing example, the information

required for displaying the detailed information on the printer unit 2 using the display section 301 of the scanner unit 3 is stored within the printer controller 202 of the printer unit 2; however, it may be arranged so as to add the necessary information for displaying the above information using the display section 301 of the scanner unit 3 in the printer unit 2 when combining the printer unit 2 and the scanner unit 3.

[0084]

[EFFECTS OF THE INVENTION] As described, the image forming apparatus of the present invention is an image forming apparatus which can be functioned, for example, as a copying machine, including: an independently operable scanner unit equipped with a display section and a display control section and an independently operable printer unit equipped with a display section and a display control section, in which the scanner unit and the printer unit are provided as separate members, wherein: the scanner unit uses a large size display unit capable of displaying graphics; the display control sections of the scanner unit and the printer unit cooperatively control the display sections of the scanner unit and the printer unit such that: in an independent use

of the printer unit, the display section of the printer unit is set to be effective, and in a combined use of the printer unit and the scanner unit, the display section of the printer unit is set to be effective if a predetermined condition is satisfied, and if not, only the display section of the scanner unit is set to be effective in displaying information regarding the combined use of the printer unit and the scanner unit.

[0085] Thus, the user needs to see only one of the display sections, which is set effective, and the problem of vexatious complication in checking both of the display sections can be eliminated. As a result, improved operability and convenience can be achieved, and in the meantime, the effect of reducing power consumption can be expected.

[0086] As described, the image forming apparatus of the present invention includes an input section for the display section of the scanner unit and an input section for the display section of the printer unit, and the display control section of the scanner unit and the printer unit determines whether to permit or prohibit an input operation by the input section of the scanner unit and the input section of the printer unit, depending on whether

the display section corresponding to the display control section of the scanner unit is effective, and whether the display section corresponding to the display control section of the printer unit is effective.

[0087] Thus, the user only needs to perform input operations by using respective input section provided adjacent to or integrally with the display sections, thereby simplifying the input operation by the user.

[0088] As described, the image forming apparatus of the present invention is arranged such that the printer unit includes a shielding member realized by such as a slide shutter, etc., for shielding the display section to be invisible by a user when the display control section controls the display section of the printer unit to be ineffective.

[0089] Thus, the user needs not check the contents of the information displayed in the display section but only needs to see the display section itself of the scanner unit, and it is therefore possible offer a better solution to the problem of vexatious complication.

[0090] As described, the image forming apparatus of the present invention is arranged such that the predetermined condition is that information to be

displayed in the printer unit is different from the information regarding the combined use of the printer unit and the scanner unit.

[0091] Thus, it is possible to provide other information to the user while eliminating the complicated process of confirming the display, etc.

[0092] As described, the image forming apparatus of the present invention is arranged such that the predetermined condition is that a failure has occurred in the scanner unit.

[0093] Thus, in response to such possibility that the large-size display section may not be functioned properly, the occurrence of the failure is promptly informed to the user by using the display section of the printer unit, thereby reducing the downtime of the apparatus due to the failure.

[0094] As described, the image forming apparatus of the present invention, in response to the failure occurred in the scanner section, displays the state of the failure in the display section of the printer unit in such a manner that a display indicative of the state of the scanner unit and a display indicative of the state of the printer unit appear alternately.

[0095] In this way, the user can be indicated not only the state of the failure in the scanner unit but also the state of the print processing of the printer unit.

[0096] As described, the image forming apparatus of the present invention is arranged such that the predetermined condition is that some failure has occurred in the scanner unit or in any other optional unit such as the feed unit or the discharge unit to be used in combination with the printer unit.

[0097] Usually, when a failure has occurred, a failure indicative display appears only when the corresponding function is selected. By thus installing the large size display section, the message indicative of the occurrence of failure is displayed in the display section of the printer unit, when the failure has occurred. This allows to call for the user's attention, and allows to inform the user of the occurrence of the failure promptly. In this way, it is possible to reduce the downtime caused by the failure.

[0098] As described, the image forming apparatus of the present invention is arranged such that the predetermined condition is that an input operation is performed by the input section of the printer unit.

[0099] By thus displaying the state of the printer unit in response to the operation of the user, it is possible to realize an interface easily understood by the user.

[0100] As described, the image forming apparatus of the present invention is arranged so as to include: an independently operable scanner unit equipped with a display section; an independently operable printer unit equipped with a display section, in which the scanner unit and the printer unit are provided as separate members, wherein: the display section of the scanner unit is a large size display unit capable of displaying graphics, the display section of the printer unit being provided on a front surface side of the scanner unit, and the display section of the printer unit is provided on an upper surface on a back surface side of the printer unit.

[0101] In this way, the display section is invisible from the user when the printer unit and the scanner unit are used combined, since the scanner unit is provided above the printer unit. This thus eliminates the problem of the vexatious complication, thereby an improved operability and convenience can be achieved.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[Fig. 1] The drawing is a longitudinal cross-sectional view of an image forming apparatus in accordance with one embodiment of the present invention.

[Fig. 2] The drawing is a block diagram illustrating the structure with regard to a display control of a printer unit and a scanner unit in the image forming apparatus of Figure 1.

[Fig. 3] The drawing is a front view of an operation panel provided in the aforementioned scanner unit.

[Fig. 4] The drawing is a view illustrating a copy mode screen that is a default screen in a display section of the operation panel of the aforementioned scanner unit.

[Fig. 5] The drawing is an explanatory view illustrating an image send mode screen in the display section of the operation panel of the aforementioned scanner unit.

[Fig. 6] The drawing is an explanatory view illustrating a progress report screen of a job in the display section of the operation panel of the aforementioned scanner unit.

[Fig. 7] The drawing is a front view of the operation panel provided in the aforementioned printer unit.

[Fig. 8] The drawing is an explanatory view

illustrating a copy mode screen that is a default screen in the display section of the operation panel of the aforementioned scanner unit.

[Fig. 9] The drawing is a view illustrating a default screen in an independent use of the printer unit.

[Fig. 10] The drawing is a view illustrating a display example of a display section of a scanner unit when a paper jam occurred in a transport path of a printer unit.

[Fig. 11] The drawing is a view illustrating a display example of the display section indicative of a paper jam in a longitudinal transport path of the printer unit in an independent use of the printer unit.

[Fig. 12] The drawing is a view illustrating a display example in the display section of the scanner unit when supplying paper to a paper storage tray of large volume.

[Fig. 13] The drawing is a view illustrating a display example of a display section when supplying sheets to a paper storage tray of a large volume of the printer unit in an independent use of the printer unit.

[Fig. 14] The drawing is a view illustrating a display example of a printer unit of another image forming apparatus in accordance with another embodiment of the present invention.

[Fig. 15] The drawing is a view illustrating another

display example of a printer unit of another image forming apparatus in accordance with another embodiment of the present invention.

[Fig. 16] The drawing is a view illustrating another display example of a printer unit of another image forming apparatus in accordance with yet another embodiment of the present invention.

[Fig. 17] The drawing is a view illustrating another display example of a printer unit of another image forming apparatus in accordance with another embodiment of the present invention.

[Fig. 18] The drawing is a view illustrating another display example of a printer unit of another image forming apparatus in accordance with still another embodiment of the present invention.

[Fig. 19] The drawing is a perspective view of still another image forming apparatus in accordance with another embodiment of the present invention.

[Fig. 20] The drawing is a perspective view explaining an operation of a slide shutter in the image forming apparatus of Figure 19.

[Fig. 21] The drawing is a perspective view of a printer unit of still another image forming apparatus in accordance with another embodiment of the present

invention.

[Fig. 22] The drawing is a side view of the image forming apparatus adopting the printer unit of Figure 21.

[REFERENCE NUMERALS]

1, 1a, 1b Image forming apparatus

2, 2a, 2b Printer unit

3 Scanner unit

4 Automatic document feeder

5 Sheet post-processing unit

6 Multi-stage feed unit

7 System rack

8 Relay transport unit

10 Both-sided transport unit

11 Both-sided transport path

20 Electrophotographic processing section

20a Photoreceptor

21, 61, 62, 63 Paper feed section

22 Optical scanning unit

23 Fuser

24 Printer unit control section

25 Image control section

26 Power source unit

51 Discharge tray

30 Document placement plate

34 Photoelectronic transfer unit

200, 200a, 200b Operation panel

201 Small size display section

202 Printer controller

203 VRAM

204 Engine controller

205 Display section (LED)

210 Operation section

250 Slide shutter (shielding member)

300 Operation panel

301 Large size display section

302 Scanner controller (display control section)

310 Operation section

[TITLE OF THE DOCUMENT] ABSTRACT

[ABSTRACT]

[OBJECT] To offer an effective use of a large size display section 301 of a scanner unit 3 and which eliminates the problem of vexatious complication in referring to a display section 301, in an image forming apparatus 1 arranged so as to include at least an independently operable scanner unit 3 equipped with a display section 301 and an independently operable printer unit 2 equipped with a display section 201, in which the scanner unit and the printer unit are provided as separate members.

[MEANS TO ACHIEVE THE OBJECT] In an independent use of the printer unit 2, the display section 201 of the printer unit 2 is set to be effective, and in a combined use of the printer unit and the scanner unit such as a copying operation, just the display section 301 is set to be effective in a usual state. Thus, the user requires to only refer to the display section 301 in which the display is performed, thereby eliminates the vexatious complication, and improve the operability and convenience. In addition, the effect of reducing power consumption can be expected.

[SELECTED DRAWINGS] Fig. 1